

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

REC'D	11 OCT 2005
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To:

see form PCT/ISA/220

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**  
(PCT Rule 43bis.1)

<p>Applicant's or agent's file reference see form PCT/ISA/220</p>			<p>Date of mailing (day/month/year) see form PCT/ISA/210 (second sheet)</p>
<p>International application No. PCT/GB2004/004687</p>	<p>International filing date (day/month/year) 08.11.2004</p>	<p>Priority date (day/month/year) 12.11.2003</p>	
<p>International Patent Classification (IPC) or both national classification and IPC G06T7/20</p>			
<p>Applicant BRITISH TELECOMMUNICATIONS PUBLIC...</p>			

**1. This opinion contains indications relating to the following items:**

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for International preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

<p>Name and mailing address of the ISA:</p> <p> European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465</p>	<p>Authorized Officer</p> <p>Borotschnig, H Telephone No. +49 89 2399-7459</p> <p></p>
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WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.  
PCT/GB2004/004687

**Box No. I Basis of the opinion**

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.  
 This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:  
 a sequence listing  
 table(s) related to the sequence listing
  - b. format of material:  
 in written format  
 in computer readable form
  - c. time of filing/furnishing:  
 contained in the international application as filed.  
 filed together with the international application in computer readable form.  
 furnished subsequently to this Authority for the purposes of search.
3.  In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or  
industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	3,5-7,8-11,16,18-24
	No: Claims	1-2,4,12-15,17
Inventive step (IS)	Yes: Claims	6-7,9-10,19-20,22-23
	No: Claims	1-5,8,11-18,21,24
Industrial applicability (IA)	Yes: Claims	1-24
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1 Reference is made to the following documents:

- D1: XP10628788, Sangho Park; Aggarwal J K: "Segmentation and tracking of interacting human body parts under occlusion and shadowing", Motion and Video Computing, 2002. Proceedings. Workshop on 5-6 Dec. 2002, Piscataway, NJ, USA, IEEE, pp. 105-111, 2002-12-05
- D2: XP10607724, Marcenaro L; Ferrari M; Marbesotti L; Regazzoni C S: Multiple object tracking under heavy occlusions by using kalman filters based on shape matching, PROCEEDINGS 2002 INTERNATIONAL CONFERENCE ON IMAGE PROCESSING. ICIP 2002. ROCHESTER, NY, SEPT. 22 - 25, 2002, INTERNATIONAL CONFERENCE ON IMAGE PROCESSING, NEW YORK, NY : IEEE, US, VOL. 2 OF 3, PP. 341-344, 2002-09-22
- D3: A.Senior, A.Hampapur, Y-L Tian, L. Brown, S. Pankanti, R. Bolle: "Appearance Models for Occlusion Handling" in Proceedings of Second International workshop on Performance Evaluation of Tracking and Surveillance systems (PETS 2001), in conjunction with CVPR'01, Dec. 2001.

- 2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **independent claims 1, 12, 14 is not new** in the sense of Article 33(2) PCT.
  - 2.1 Using the wording of claim 1 document D1 discloses (the references in parentheses applying to this document, the analysis of claim 1 being valid mutatis mutandis also for claims 12 and 14): a method of tracking objects in a sequence of video images, comprising the steps of: storing object models relating to objects detected in previous video images of the sequence, the object models comprising values of characteristic features of the detected objects and variances of those values
    - cf. D1 abstract, section IV, eqs. (9)-(11),

receiving a further video image of the sequence to be processed; detecting objects in the received video image; determining characteristic features of the detected objects; calculating a distance measure between each detected object and each object model on the basis of the respective characteristic features using a distance function which takes into account at least the variance of the characteristic features;

cf. D1 *ibid.*:  $\Delta_{ij}$  Mahalanobis distance of six features

matching the detected objects to the object models on the basis of the calculated

distance measures; and updating the object models using the characteristic features of the respective detected objects matched thereto.

cf. D1 ibid. + paragraph below eq. (14)

3 The subject matter of the dependent **claims 2-5, 8,11, 13,15-18,21,24** lacks novelty or an inventive step:

claims 2,4,15,17: lack of novelty, cf. D1 ibid. Mahalanobis distance  
claims 3,16: lack of inventive step, cf. D1 ibid.  $D(I,k)$  is simply the square root of eq. (11) and the options of using the square or the square root as a similarity measure are both equally trivial.  
claims 5,18: lack of inventive step, while D1 does not base its comparison on predicted values, the use of Kalman filters in tracking to make predictions is ubiquitous with D2 sections 4 and 5 providing only one example. Employing this standard technique also in D1 must be considered as not involving any inventive step.  
claims 8,21: lack of inventive step, D1 explicitly mentions that better occlusion solvers could be possible extension (see section VI Results). Hence the skilled person would consult the relevant literature, find i.a. D3 and consider combining it D1. D3 checks for overlaps (cf. e.g. section 5 and Fig. 2 of D3).  
claims 11,24: lack of inventive step, resulting from combining D1 with D3, cf. e.g. section 5 of D3.  
claim 13: lack of novelty, implicit in D1.

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AUTHORITY (SEPARATE SHEET)**

International application No.

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4 In contrast to the foregoing, the subject matter of **claims 6-7,9-10,19-20,22-23** appears to be neither disclosed nor straightforwardly derivable from the considered prior art. Each of the claims 6,7,9,10 defines a way of rendering the tracking more robust by reacting "gracefully" to various special conditions:

claims 6-7,10,19-20,23: graceful degradation upon loosing track of an object in the hope that it might reoccur, thus handling detection errors as well as very brief occlusions,

claims 9,22: newly occurring blobs are only treated as new objects if they persist over a number of frames (thus avoiding sensitivity w.r.t. "noisy" blobs).